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THE GREGARIOUS HABIT OF BEETLES

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(Concluded from Preceding Issue.)

8577a. **Chalcolepidius snowi** Csy. This and a number of its consorts Mr. Leng has properly placed as a variety of **C. webbi** Lec. And if there were as many species in the lot as Colonel Casey discovered, all mingling together under identical conditions, they would indeed be a happy family. A large velvety blue beetle with broad snow-white border, this superb insect can justly claim its position as monarch of the Elateridae. Small wonder that one should remember for years the experience of bottling a large number of them in one day. It happened in the early part of August, 1903, while collecting with the Snow expedition on the Bill Williams Fork of the Colorado River, in extreme western Arizona. Quite accidentally a specimen was dislodged from a tall willow sappling growing beside an irrigating ditch, and an investigative search revealed that there were numbers of them feeding high up in these willow trees, wherever the rubbing together of limbs caused a flow of sap. The trees were too slender to climb, but by making use of the fact that my net had been thoughtfully constructed on the smaller end of a jointed, bamboo fishing pole, the other three sections being affixed, it was easy to net the beetles. The same long net was doing excellent service daily in extracting the wary Buprestid, **Actenodes calcarata** (Chev.), from the spiny, inaccessible upper limbs of the palo-verde trees **(Parkinsonia microphylla)**. The Chalcolepidius seldom flew away when dislodged from the tree, but first dropped, taking wing midway to the ground, then flying a short distance to alight on foliage, as do some Buprestids of the genera Dicerca and Chalcophorella.

9304. **Thrincopyge ambiens** (Lec.). If perhaps less showy than the spotted **T. alacris** Lec., this Buprestid is one to be no less prized in a collection. Not alone does it come from rather inaccessible parts of the map, but its habits are such as to make its collection very difficult. It breeds in the flower stalks of sotol (**Dasylirion** spp.), a

yucca-like plant inhabiting the dry mountain ranges of the extreme southwest, and the adults hide down among its thickly growing leaves, whose margins are armed with multitudinous curved spines, all directed downward. In addition to that, the beetle is extremely active in playing hide and seek among these leaves with its pursuer. To thrust the hand down among the forbidding array of spined leaves is one matter; but to follow the wily tactics of this fellow so much at home among the close-bound leaves, and to finally disengage and tear loose the hand, with the beetle retained in the grasp, is no mean stunt. Well do I remember returning to camp on a torrid midday in latter July, on the Snow expedition of 1906 into the Baboquivari Mountains of southwest Arizona, with hands torn and bleeding and the boots a bit nicked and scarred from hard use, but with a proud bottle full of these aristocratic Buprestids. Perhaps the bottle contained less than a hundred of them, but the wear and tear of the pursuit made the catch an unusual one. I had run upon an arroyo in the foothills where **Dasylirion wheeleri** was particularly abundant and many plants had flowered and the stalks were drying, and here the beetles had gathered for oviposition. In rare cases, however, was more than one beetle found on a plant, so that collecting a large number was done at the cost of great effort in a boiling sun.

———. **Hippomelas cuneata** Horn. This is a rather slender species of the **H. sphenica** (Lec.) group. It has been taken at several points in southern Mexico. On one occasion I collected a series of forty of them in an hour's time on a small group of bull's-horn Acacia trees (probably **Acacia cornigera**) that surmounted a high hill just south of the coast town of Salina Cruz, in the Isthmus of Tehuantepec, Mexico, on August 7, 1923. A rather large series of **Chrysobothris multistigmosa** Mann. was taken with them on the same trees. These last, which are long and slender in shape, have the cute habit of hiding from view on the opposite side of the limb or twig, as do some grasshoppers. I have taken them also at such widely separated points as Brownsville, Texas, and Martinez, Arizona.

9310. **Hippomelas (Gyascutus) planicosta** (Lec.) To one familiar with the habits of these beetles, there seem good grounds for a belief that Gyascutus is generically distinct from Hippomelas. This species seems to have a fairly wide range over the Sonoran zone in Arizona and New Mexico. It feeds upon the grease-

wood, or creosote bush (**Covillea glutinosa**), the pollen from whose blossoms it usually carries in abundance upon the thorax and forepart of the elytra. On one occasion I ran upon a large number of these big beetles, in August, 1903, in a dry wash overgrown with greasewood near the head of the Box Canyon of the Bill Williams Fork, western Arizona, about due west of Martinez. When alarmed they sometimes flew straight up into the air to a height of a hundred feet or more, then off a great distance with the wind, making capture very difficult.

9324a. **Psiloptera webbi** Lec. Perhaps the largest member of the family occurring north of Mexico, this species is one of rather sluggish habits, and therefor its capture does not engender the exhilaration that usually attends the pursuit of Buprestids. A large series of them was collected on September 5th, 1905, at El Paso, Texas, resting on the stems and branches of the willow-weed, or giant arrowwood (**Berthelotia sericea**), a tall weed reaching to a height of ten feet that somewhat resembles straight willow saplings and grows in dense clusters along the southwest bank of the Rio Grande. Very probably the larvae bore in the roots of this weed.

9374. **Buprestis rufipes** (Oliv.) Even the experienced Coleopterist is gratified to be able to add so many as a half dozen of this fine, tropical looking species to his collection in a summer, and may pass summers without adding one. My first encounter with it was on a very ancient dead elm tree near Topeka, Kansas, in 1901, and a few were taken the following summer on the same tree, but it was not again encountered for a score of years. Just once it was found in numbers. Two dozen specimens were taken in two days on July 21 and 22, 1926, on a small group of dead beech trees, killed by overflow of a creek, at Beverly Hills, a suburb of Philadelphia, Pa. Those too high on the trunks to reach, had to be patiently awaited until chance brought them closer to the ground.

———. **Agrilus squaliformis** Thom. A large and very elongate, steely-gray species that seems to have social habits, as a rather large series of them was collected on a single tree of **Urera caracasana** growing in a fertile pasture at Guatemala City, Guatemala, July 23, 1923. Nearby trees of the same species bore no specimens of the beetle. This tree has a very large, cordate leaf borne on a long stem, and the Buprestids rested

usually near the center of the leaf, one on a leaf, with the head upward, without any movement.

10300. **Cypherotylus boisduvali** Chev. This Erotylid is a beetle of such very frail body structure that, unless pinned with the greatest care, it is very apt to be broken in doing so. It is an inhabitant of the Canadian Zone in the mountain ranges of the southwest. I at one time collected a very large number of them in one day, grouped about fungi on the undersides of decayed logs in a damp, shady spot among pine and alder trees in Oak Creek Canyon, south of Flagstaff, Arizona, in August, 1904.

———. **Aegithus rufipennis** . If there is anything in the theory of protective coloration this beetle may serve as an excellent example to prove it. Bright scarlet red in color, it was found in numbers feeding upon some orange-scarlet shelf fungi that were just a little less brilliant in color, growing on fence posts along the road near Ingenio El Salto, not far from Escuintla, Guatemala, on May 26, 1923.

10347. **Megalodacne heros** (Say). Doctor Blatchley, in his Coleoptera of Indiana, says of this beetle: "Much less common than **fasciata** and seldom more than two or three found together." The only time I have found it, however, it was in some numbers. On June 15, 1926, in a small wood at Springfield, a suburb of Philadelphia, Pa., 53 specimens were collected within a small space on polyporous fungi on the underside of a decaying log, and four days later 9 additional specimens were found on the same log. Efforts to find the larvae or pupae were not successful, however.

———. **Strongylium auratum** Cast. . . The Tenebrionidae are known mostly for their repugnant or unattractive qualities; for ill smell, homely coloring (the larger species the world over are mostly dull black) or sluggish and ungainly movements. To find a species, large in dimensions, that departed from all of these characteristics would have been strange enough; to run suddenly into the midst of a swarm of them was an event calculated to impress itself well on the memory. This insect not only rivals some of the handsomest Buprestidae in its coloring, but in its activity as well. The bright iridescent purples and greens of the dorsal surface only partially hide the bright red sides and tip of the abdomen. On the Hacienda Monte Grande, not far

from the sweltering tropical town of Coatepeque, Guatemala, while searching for Epilachna parasites in a bean field in a clearing in the jungle, a swarm of these beautiful beetles was found on a small dead tree some twenty feet in height, clinging to its upper limbs and branches, which were so bare of foliage that it was not possible to determine the species of tree. The beetles were very alert, and took wing with greater facility than do any but the most active Buprestids. With aid of a net over seventy specimens were collected in a brief space of time. The date was May 29, 1923.

———. **Phanaeus tridens** Cast. The members of this genus outrival both in form and coloring those of any other in the family Scarabaeidae, if not indeed in the whole order Coleoptera. In some parts of Central America there occurs what might be known as a "Phanaeus complex." Two and sometimes three or four species occur together intermingling, each with as many variations in form and color as any one species may well have, the extremes of size and form in one species differing from one another far more than does one species differ from the other, so that to separate individuals into their respective species is well nigh impossible without examining the genitalia in each case. Such a complex was found on the Finca Margarita near Guatemala City on July 25, 1923. A series of over thirty specimens was collected in about an hour's time, within a space of less than a square rod, in an open pasture. The beetles were all taken in flight as they were attracted to manure, both cattle and human, the majority coming to the latter. The sexes occurred in equal numbers, and perhaps 40 per cent of the specimens were of this species, the remainder being divided among two or more related species. In coloration the series varied from those bright green, through brassy green, cupreous and deeper bronze to dark purplish brown; in size both sexes varied from 14 to 21 mm. in length. Males varied from those with horns 12 to 13 mm. long to some quite without horn.

13716a. **Anomala polychalca** Bates. Occasional specimens of this species have been taken at various points in southern Mexico, and on September 4, 1923, a number of them were found dead under a quacima tree (**Guazwna** sp.) at Cuernavaca, which were found to contain puparia of a parasitic Tachinid fly, that has not yet been determined. On one occasion only the species was

found in large numbers. On October 29, 1922, near Cuautla in the state of Morelos, in the late afternoon a swarm of them was found in the foliage of a mesquite tree, **Prosopis juliflora,** where they had congregated for mating. A series of 65 specimens was collected in a few minutes.

———. **Calomacraspis splendens** One of the most brilliant of that splendid group of Rutelids with greatly enlarged scutellum, this beetle was taken in abundance at Oaxaca, southern Mexico, on Sept. 24, 1923. Over a hundred specimens were taken from the large white, tubular flowers of a tree Ipomoea that grows along the irrigation ditches on hillsides above the town; they fed on the pollen and to some extent upon the petals of the flowers. When alarmed they took wing very quickly. Other beetles that fed with them in the same blossoms were **Euphoria basalis** and two species of Lytta.

13937. **Euphoria fulgida** (Fab.) This bright green insect is widely distributed over the east central United States, but usually rare in occurrence. Only once we found it in abundance, on May, 1905, in the rolling, thinly wooded clay hills south of the Meramec River, a few miles southwest of St. Louis, Mo. While collecting **Cicindela transversa** Leng. along the bare roads running through the scrub oaks, one of the trees was accidentally jarred and two of the Euphorias fell to the ground. Further jarring revealed the fact that they were feeding in numbers on the young germinating oak buds, over a rather small area, and a fine series of them was collected.

13957. **Euphoria fascifera** (Lec.) Occasional specimens of this rather brightly marked species, which was described from Lower California, had been beaten from mesquite and acacia foliage by members of the Snow Expedition of 1903 at Martinez, Arizona, but they were hard to find and were always considered rare. On July 30th, when the Snow Expedition of 1905 was crossing the low Perilla Mountains east of Douglas, Arizona, these beetles were seen flying in abundance at one place around flowering acacia trees, and a good number were collected with nets while the wagon was passing.

———. **Euphoria biguttata** G. and P. Ornately patterned with orange-red, black and white, so handsome an insect really deserves a better name. It has a fairly

wide distribution in southern Mexico and Guatemala, and occurs rarely in a melanic form, which has received the name **E. lineoligna** Blanch. Once, while brousing about the flowers in the garden of the very old cathedral in Cuernavaca, Mexico, on Oct. 24, 1922, I discovered the sunflower heads to be infested with these beetles, and collected a fine series of them. They buried themselves very effectively among the pistillate blossoms in the center of the head, and with them occurred numbers of the much commoner **Euphoria subtomentosa** Mc., which occurs very generally through the state of Morelos wherever sunflowers bloom.

———. **Euphoria submaculosa** G. and P. In the shady, lazy and tropical town of Orizaba, Mexico, on September 28, 1923, I came upon a good number of these beetles feeding on the top stems of a small, slender tree (**Boehmeria caudata** Sw.) that grew commonly along the shady lanes. They fed upon the flowing sap. This species is dull green in color, suggestive of our American **E. herbacea** (Oliv.), but larger in size and more slender in shape.

13970. **Macropodina planata** (Lec.) By extreme good fortune the writer once stumbled upon a nice series of this very rare beetle, which may be readily distinguished from the species of Cremastocheilus by the very elongate front tarsi, as well as by the larger size and more flattened dorsum. Half running to keep up with the wagon and mules, yet wishing to miss nothing that the pampas might deliver over in the way of beetles, he was rewarded by finding over a dozen of these very odd beetles strewn about the entrance holes of two hills of the agricultural ant, **Pogonomyrmex barbatus,** on the high Mesa land that lies just east of the Perilla Mountains in southeastern Cochise County, Arizona, near the Mexican border. It was on the 2nd of September, on the return trip of the 1905 Snow Expedition from the San Bernardino Ranch to Douglas. The beetles were all dead, and quite fifty percent of them were fresh and perfect, tho some of them were dismembered. It is quite unfortunate that there was no opportunity to make a study of the reasons that the ants had for killing and ejecting their guests.

13981. **Cremastocheilus nitens** Lec. Beetles of this genus are usually found associated with ants, and once in the Santa Rita Mountains, southeast of Tucson, Arizona , the writer found an adult of a smaller species

being led along, in a marching column of ants, by the tarsus of one front foot. It lumbered along blindly, and was yanked ruthlessly back into the column when it headed away from it to either side. Unfortunately no record is available now of either the species of ant or of Cremastocheilus. Usually these beetles are sluggish, but the species **nitens** proved quite an exception to this rule. In the sandhills of the Cimarron River, southeast of Englewood, Kansas, in early June, 1903, the beetle was found flying about the highest and barest dunes, alighting on the steeply sloping sides most exposed to sun and wind. Here they rested in great alertness, and often took wing to chase one another about. Perhaps it was the mating season, and they had chosen this spot as a rendezvous. They were more wary than tiger-beetles, and clever net work was necessary to get a series of them.

14083. **Derobrachus geminatus** Lec. This is the largest Cerambycid the writer has seen from the United States, and unlike most members of the family, the female is larger than the male, often measuring more than three inches in length of body. We found these big fellows at Martinez, Arizona, in the last week of July, 1903, when the Snow Expedition visited that place. When flying they seemed as large as bats, and it was great sport chasing them or intercepting and netting them as they flew up and down the broad, dry Hassayampa Wash at dusk. It was the nuptial flight and the males were flying about in search for their mates. The females concealed themselves on the ground among the roots of dead and dying mesquite and acacia trees, often half buried in the soil, with only the tip of abdomen exposed. The alighting of two or more males on a spot of ground meant in each case the discovery of a female, and usually the finding of still more males that were attracted to her. The gravid females seemed well engorged with eggs, as the tip of the abdomen always extended beyond the elytra.

———. **Stenodontes bituberculatus** P. de Beauv. Near the old hacienda house at Santa Rita, the railroad Junction for Guanica Centrale on the south coast of Porto Rico, is a grove of large and very old tamarind trees, with a few guacima trees **(Guazuma guazuma)** scattered among them. Many of these trees have caverns in their large, burled trunks, from which the decayed wood is thrown out upon the ground by the borers that work in the rotting heartwood, and most conspicu-

ous among the borers is the large Stenodontes. Collecting one sultry night among these trees in search of Maybeetles, on June 24, 1913, several of the big Prionids were found crawling on the trunk, and further search brought forth a good number of them from the caverns in the trunks. In several cases the males were found in active combat, their long and heavy mandibles engaged scissor-like in their head-on struggles to dislodge one another from a foothold on the bark. Their mandibles have great crushing strength, and if two males are kept in confinement with a female, they will literally dismember one another.

———. **Deltaspis rubriventris** Bates. Returning one day from Tetecala, in the state of Morelos, by a dry desert road toward Cuernavaca, Mexico, on November 6, 1922, we noticed some large insects resting on a Sida bush beside the road. Nearer approach revealed them to be this handsome green and red Cerambycid. Very active in the bright sunshine, they all took wing, and only quick work with the net saved some fifteen specimens from what must have been over thirty of them. It would be interesting to know what attraction for them the Sida bush possessed. We know that a smaller Cerambycid, **Tulosis puncticollis** Bates, breeds commonly in Sida in southern Mexico, but the Deltaspis seems rather too large to breed in such slender stem.

14786. **Stenaspis perticalis** Serv. The multifarious flora of a truly isolated range of mountains like the Baboquivaris, in southwest Arizona, gives birth to an equally diversified insect fauna, and the beetle collector may always expect surprises in such an environment. Climbing one sultry forenoon in middle July, 1906, over a succession of precipitous foothills bordering this range, I came upon a hillside quite heavily clothed with a rather large and very rotund bush, whose foliage was much greener than that of surrounding vegetation. It is unfortunate that the identity of the plant was not established. Other hills bore a few of the same bushes; but here it had established itself in profusion. On these bushes was taken a fine series of this handsome Cerambycid, which there can be no doubt breeds in the stems or roots of the same. Not elsewhere in Arizona has the species been encountered, even with an exhaustive study of some dozen or more other localities in the state.

15081. **Lochmaeocles marmoratus** Csy. One of the

puzzles of Nature is why the largest wood boring beetles do not occur where grow the largest trees. Contrarily, they are usually to be found where trees are small and stunted. This noble insect, comparable to the finest found on any continent, has chosen however, one of the few large trees occurring among the desert flora, the willow. Its habits are similar to those of Oncideres, except that to oviposit it does not sever the limb to a point where it falls to the ground, but only partly severs it, so that the limb remains in situ and suffers a lingering, protracted death, or may as often continue to live. The limb in which the beetle's transformations have taken place may look quite normal, or simply dilated, from its upper aspect. But on underside it shows a long and ugly scar, as long nearly as the larval tunnel, with occasional eruptions of chewed fragments and frass, these often partly overgrown with fresh tissue. Having searched long for a few of these beetles along the main water course of the San Bernardino valley, in extreme southeast Arizona, I crossed one day (in August, 1905) into a narrow side valley where the willows grew in profusion in a pocket between the gravelly confining hills, and there stumbled upon more of the big beetles than could be bottled at one time. Very considerable climbing of trees was entailed, however, in securing them.

———. **Anomoea rufifrons** Lac. On a trip between Cuautla, state of Morelos, and Mexico City I stepped off the train one day for a short interval as it waited on a siding, near La Cascada, on June 5th, 1922, and found an acacia tree (apparently **Acacia farnesiana**) quite heavily infested with a Clytrid that turned out to be this species. No other acacias nearby were infested; this particular tree seemed to attract them. Thirty specimens were collected with a few sweeps of the net, but large numbers of the beetles flew away to distant trees. Of the thirty, 22 were male and 8 female. The male is easily distinguished by the elongate front legs, and by having more yellow on the elytra.

15284. **Megalostomis pyropyga** Lac. Most elegant of all the Megalostomids, and rivalling any of the American Chrysomelids in color designs, this dainty beetle seems to have a wide range, but to be very rare everywhere. I have taken it at three points in southern Arizona, as well as at Cuernavaca and Oaxaca in southern Mexico. Once only I found it in numbers, in the latter part of August, 1905, in the extreme southeast

corner of Cochise County, Arizona. A rather tall specimen of the common desert tree, **Acacia constricta,** growing at rim of the mesa which borders the dry San Bernardino Valley, bore perhaps two hundred specimens on its foliage. They were quite out of reach, and quickly took to wing when the tree was shaken, but several dozen were recovered with the net. Such an opportunity presents itself but once in a lifetime. As there were many others of the same species of Acacia growing near at hand, none of which bore any of the beetles, this experience confirms the belief that many other forces than mere food preference bring together large numbers of an insect to a common resting place.

———. **Nastinus auriquadrum** . The cupreous metallic lustre of this odd beetle's elytra is in strong contrast to the dull, dirty yellow color of its distended abdomen, which extends some distance behind the elytra. A swarm of them was encountered once, between trains, in the small town of Tehuacan, state of Puebla, Mexico, on September 25, 1923. They fed upon the foliage of a yellow-flowered composite (probably **Simsia** sp.) that grew to a height of three to four feet in vacant lots about the town.

——— **Metacycla caeruleipennis** . The body of this beetle, like the preceding species, becomes tremendously distended in the gravid female, so that it assumes a shape not unlike that of some of the so-called oil beetles in the Meloidae. The species feeds upon a composite bush, **Stevia rhombifolia** H. B. K., that seems to grow in abundance on both north and south slopes of the mountains separating Cuernavaca from Mexico City. Although the plant is very common, the beetle is usually rare. Once only an aggregation of them was found together, on a hillside above Tulyehualco, a suburb of Mexico City, on August 30, 1923. In the same lot were adults in various stages of sexual maturity. A peculiarity of this beetle is that, as the female becomes gravid and increasingly swollen, the thorax changes in color, from white, though sooty gray, to almost black. There are also other changes of color following pregnancy, so that individuals at different stages of development might easily be described as separate species by those ardent descriptionists who revel in small details of color pattern and do not hesitate to clutter the nomenclature, at the cost of much labor for future generations to disentangle their snarls.

NOTES ON THE NEUROPTERA AND MECOPTERA OF KANSAS, WITH KEYS FOR THE IDENTIFICATION OF SPECIES.

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The writer, in 1925, reported 41 species of Neuroptera and five species of Mecoptera from Kansas. Considerable collecting has been done since that time in the state, so that it is possible to add 17 species of Neuroptera, and one species of Mecoptera to the list. The names of some previously listed species have been changed and are now being listed according to the latest revision. In addition, keys are included for the identification of all the species of these two orders known to occur in the state. These keys are provided for the special use of students in Kansas institutions and are, more or less, inadequate for use in other states. Additional western and southern species of these two orders will, no doubt, ultimately be collected within the borders of Kansas, particularly in the western and southwestern parts of the state.

NEUROPTERA

Sialidae

No additional species of Sialidae have been noted since the previous report. However, many specimens of **Corydalis cornuta** Linn. and of **Sialis infumata** Newm. have since been taken, especially in eastern Kansas. These species may be identified by the following key:

A. Length greater than 35 mm. when wings are folded.

B. Small white dots in the membrane of all the cells of the front wings; two white dots in many costal cells; males with jaws 10-25 mm. long. ..... **Corydalis cornuta** Linn.

Contribution No. 413 from the Department of Entomology.

(1) This paper is based on specimens from the Snow Museum of Kansas University, especially collections by Dr. R. H. Beamer; the collection of Kansas State College, especially collections by Dr. R. H. Painter, the collection of the late F. F. Crevecoeur, and of the author. The writer wishes to acknowledge the help given at various times by Prof. Nathan Banks of the Museum of Comparative Zoology, and the Bache Fund Grant No. 286 for study of types at Harvard University.

BB. No white dots in the cells; jaws of males inconspicuous.

C. Black wings with white spots or bands. ..... **Nigronia serricornis** (Say)

C.C. Brown body and wings; veins or wings alternately spotted with white and brown. ..... **Chauliodes rastricornis** Ramb.

AA. Length under 15 mm. with folded wings. Wings and body entirely black. ..... **Sialis infumata** Newm.

Mantispidae

No species have been seen in Kansas in addition to the three previously reported. However, some new life history and field observations have been made on certain species which are included herewith.

Observations on Mantispa sayi Banks

A female was collected by beating the branches of a box elder tree, July 7, 1926. From this date to August 9, she deposited approximately 2,200 eggs in six major depositions (Fig. 1). The eggs hatched in nine to eleven days, the percentage of fertility being almost 100. A description of an egg follows:

Egg elongated, elliptical, dull grayish in color, on a slender, clear, gelatinous stalk. Tiny, raised, white micropyle at apex. Chorion, partly shining, smooth, semi-translucent, with microscopical whitish flecks over entire egg. Stalk attached to center of base in all cases, drawn out very thin, either straight or slightly curved, attached to substratum by small disk. Eggs of cluster remarkably uniform in appearance. Deposited in a fairly dense cluster, but without definite arrangement; for the most part equidistant or nearly so from each other. Average length 0.39 mm.; average diameter 0.18 mm.; length of stalk 0.66 mm.

Description of an egg of Mantispa sayi ready to hatch.

Eggs ready to hatch showed very plainly, two prominent black eye spots on the ventral side just below the apex. Above and immediately below the eyes, there was an area without color. About midway, four red cross-bands of the end of abdomen of the embryo could usually be seen very plainly. Red cross-bands extended around upon the dorsum, there being three complete ones on the dorsum. In the region of the thorax of the embryo, the red occurred only at the side of the egg, the central portion being grayish. A nearly complete red bar occurred in the region of the prothorax of the

embryo, almost opposite the eyes. The eggs had prominent furrows laterally as in Chrysopid eggs. The micropyle was white and conspicuous. No egg burster could be seen in the mid-ventral line.

Description of hatching of M. sayi

The first evidence of hatching was a slight bulge in the region of the head on the ventral side. Close examination showed that the embryo was withdrawing the abdomen from the ventral side with a corresponding crowding of the region of the apex. Pressure was exerted above the eyes. The egg shell appeared to give way gradually instead of being cut. Forty-eight seconds after the bulge became prominent, the chorion was seen to tear. The larva lifted itself upward by means of its abdomen, the mouth parts and legs lagging behind as if attached along the ventral line. In three minutes and five seconds the larva was entirely out of the egg shell, except the tip of the abdomen which supported it. Then followed a series of movements calculated to withdraw the mouthparts and separate them. The embryo rested upon the egg supported by the abdomen until the legs could support it. This required four minutes and ten seconds. The larva then rested upon the egg shell withdrawing the abdomen from the shell and descending in five and a half minutes. There are three ways of descending, viz, walking head first down the stalk, reaching over and coming down a neighboring egg, or by holding fast to the egg and reaching down to the substratum.

Description and habits of newly hatched larva.

Newly hatched larvae were active and appeared to be looking for food. They did not attempt to feed upon the eggs of their own kind. They were predominately gray or light amber in color with the exception of a red cross-band on the posterior margin of each abdominal segment, and a reddish spot at the sides of each thoracic segment and on all abdominal segments except the last. The head was uncolored except for the black eyes. The palpi, which are short, stout and uncolored, are used to feel their way along the substratum. The antennae which are very similar to those of the Chrysopids reach forward. The head jerked from side to side as the larva walked. The larvae grouped themselves in a rather closely packed mass at the base of the egg stalks. A few restless ones crawled about over their fellows who seemed not to notice it. They made no effort to feed upon each other or upon the unhatched eggs. The egg shell, after

hatching, was white, laterally indented and out of shape. The embryonic molt protruded from the opening.

Brauer (1869) stated that the newly hatched larvae overwintered as such and entered the egg sacs of spiders in the spring. Many egg sacs of several kinds of spiders were made available to the newly hatched Mantispids, but no larvae entered them. Overwintering the newly hatched, very active, young larvae was attempted, but all the larvae died in a few days. Many others were placed in a refrigerator to provide a chill stimulus in hope that they would then enter egg sacs of spiders, but none survived the refrigeration. The larvae would not feed on any small creatures offered them. These attempts to observe the life history failed and no opportunity has appeared since 1926 to make further attempts to rear this species.

Observations on Mantispa brunnea Say.

On May 27, 1928, Dr. Painter of the Department of Entomology came upon a small localized colony of **Mantispa brunnea** on Nuttall's death camas **(Zygadenus nuttallii)** in a pasture. The adults were hiding singly in the white flowers of this plant and catching the many insect visitors attracted by these fragrant flowers, being partial to flies, it appeared. The adults resembled very closely Polistes wasps. The infuscated portion of the Mantispid wing closely resembles the plaited wings of Polistes. The abdominal markings, in life particularly, are also very much like those of Polistes. This is an excellent example of mimicry, not before pointed out. The Mantispids attempted to escape by dropping, much like the death feigning beetles. The females had large distended abdomens and some lived for as long as a month in lamp chimney cages. The males which were smaller, died quickly, most of them dying in four days. About 250 eggs per female were deposited, which hatched in 11 days. The young larvae refused to enter spider egg sacs, but ate some spider's eggs and crushed aphids. The larvae all died about three days after hatching.

Description of Egg of Mantispa brunnea.

Eggs elongate oval, light salmon or light cream color, attached to a clear, slender stalk which was at least as long and as much as 1½ times as long as the egg. A small, inconspicuous micropyle occurred on the upper end. Length 0.63 mm., diameter 0.3 mm. As embryological development proceded, the embryo was outlined by reddish or brownish spots.

Observations on Mantispa interrupta Say.

Mr. C. W. Sabrosky and the writer made a collecting trip to the pasture mentioned above on October 9, 1933 to collect spider egg sacs and the sac-like nests of spiders in the hope of finding some with mantispid larvae within. A large number of spider's nests were found on buck brush, weeds and under stones. Two pupae of **M. interrupta** emerged from these sacs, one on the 10th and a second on the 13th. Neither succeeded in molting (Fig. 3). One of the egg sacs had a spider on it which was presumably its maker. The spider, a female, was sent to Professor C. R. Crosby who referred it to Professor Nathan Banks who determined it as **Philaeus militaris** Htz (often called **Dendryphantes militaris**) which is a common, widely distributed species of jumping spider.

The two cocoons from which pupae emerged were elongate oval and measured 10 mm. x 7 mm. while a third cocoon from which a parasite had emerged measured 7 mm. x 5 mm. The fibers were yellowish in color and loosely woven. The pupae had made irregular openings for emergence by pushing aside some fibers and tearing others at one end of the cocoon. The parasite had gnawed a regular smaller opening on the side of the cocoon for emergence (Fig. 4). All the cocoons were completely enclosed with the spider's silk. According to Comstock, these spiders overwinter in sac-like nests, the egg sacs being spun in the spring or early summer.

Specimens of both **M. interrupta** and **M. sayi** have been taken in October which indicates that these species may overwinter as adults.

Key to the Mantispidae known to Occur in Kansas

A. Front wings fully two-thirds infuscated with brown or blackish brown along anterior margin; hind border clear ..... **Mantispa brunnea** Say.

AA. Only subcostal and costal areas infuscated with light brown, the greater part of the wing membrane being hyaline.

B. The infuscation has a small inverted Y projection from stigma; size variable 20 to 30 mm. long ..... **Mantispa interrupta** Say.

BB. No Y-shaped projection from the stigmal infuscation. Size variable but generally a little smaller, 12-22 mm. ..... **Mantispa sayi** Banks

Sisyriidae

Sisyra umbrata Needham, which was previously record-

ed as **S. vicaria** Walker from Hodgman county, has never been taken in the state by the writer nor seen in any Kansas collection.

Climacia areolaris Walker. A specimen was collected by the writer at Wildcat creek, near Manhattan, August 27, 1926.

In addition to the four species previously reported by the writer, there should be added the following:

Sympherobiidae

Sympherobius occidentalis Fitch. Two specimens—one collected by the writer at Manhattan, August 8, 1932, and one in the Crevecoeur collection, Onaga, Kansas. This species had previously been reported from Kansas by Banks (1905, p. 40) from Onaga.

Hemerobiidae, Berothidae and Polystoechotidae

Many specimens of **Hemerobius stigmaterus** Fitch and **H. humuli** Linn. have been seen in Kansas collections since 1925. The former species is more common. **Micromus variolosus** Hagen is more plentiful than **M. posticus** Walk. In addition to these four species, the writer wishes to add from Kansas the following three species:

Hemerobius conjunctus Banks. Manhattan, July. Scarce.

Micromus subanticus Walker. A fairly common species Collected as follows: Manhattan, July, October, December; Medora, September; Onaga, October and December.

Lomamyia flavicornis Walker of the Berothidae and **Polystoechotes punctatus** Fab. of the Polystoechotidae are still the only representatives of these two families reported in Kansas. Both species are rare in this state.

Biological Notes on Kansas Hemerobiids.

Life cycle and stages of Micromus variolosus.

Eggs: Salmon or light pinkish yellow in color, with white raised micropyle. Chorion absolutely smooth, unsculptured, iridescent and shining. Indistinguishable from the eggs of **M. posticus** as described by the author (Smith, 1923). Length 0.7 mm.; diameter 0.29 mm.

Life Cycle: Egg stage 4-6 days; first larval stage 2-3 days; second larval stage 2-3 days; in cocoon 7 or 8 days; from egg to adult 15-20 days.

Description of Larvae of M. variolosus

First instar larva of same general type of coloration

and conformity as **M. posticus.** General color dark reddish-chocolate with three pairs of lateral whitish spots on the thorax.

Head translucent with three smoky spots on dorsum. Antennae and palpi translucent with a brownish tinge, caused by the annulations. Jaws short, sharp, stout, sickleshape, amber at tip. Eyes black. Prothorax quite long and prominent, lightly marked with chocolate dorsolaterally. Dorsum of body reddish chocolate. Antennal segments of abdomen lighter in color. Dorsal vessel distinct, reddish chocolate with a whitish border. Legs smoky except coxae. Width of head capsule 0.4 mm.; length 4.6 mm.

Second instar larva very dark reddish, purple or dark wine-color, marked with smoky and white areas; quite long and slender; indistinguishable from second instar of **M. posticus.**

Head smoky with three spots separated by clear lines. Antennae smoky, due to annulations. Eyes black. Jaws and palpi smoky. Palpi half again as long as jaws. Prothorax prominent, marked with reddish purple. Prothorax with 2nd sub-segment largely hyaline anteriorly, purplish behind. Meso- and metathorax largely white. Lateral areas white. A little purple around the spots. Dorsal vessel purple but with prominent whitish border, broadest at metathorax. Abdomen of 10 segments; 2 to 7 with lateral knobs, purplish, smoky-gray. Dorsolaterally the abdomen is very dark purple. Legs fairly dark brownish; coxae and upper end of femora hyaline. Width of head 0.53 mm. Length 5.3 mm.

Third instar. Characteristics exactly as described for the second instar, except width of head 0.6 mm.; total length 7.0 mm. A loose cocoon as described for **M. posticus is spun.**

Life history of Sympherobius barberi Banks.

This tiny, brown lace wing is readily taken by beating oak trees along Wildcat creek in July. The life history stages of this insect have not been described.

Egg of S. barberi Banks:

This egg which resembles other Hemerobiid eggs, is a uniform light yellow color, and is laid flat on substratum to which it adheres. Micropyle is very small, raised, circular and yellowish. The chorion is sculptured. There are numerous raised rows of white, dull papillae over the surface, surrounded by a light yellow glistening area.

The eggs were so securely attached, that the chorion peeled off when the egg was pulled free. Length 0.48 mm.; diameter 0.22 mm.

Description of first instar larva.

Head hyaline with dark or smoky area on each side. Black eye-spots at each border; jaws short, hyaline, amber at tip, stout, strongly curved inward at outer end, ending in a sharp tooth-like structure. Antennae hyaline, stout, three segmented, ending in a short spine-like segment. Palpi longer than the jaws drooping downward, and ending in short pointed segments. On dorsum of head, one can see the faint outlines of three black spots, one centrally located and a pair on each side.

Thorax and abdomen grayish, hyaline. The alimentary canal contents show through and cause the larval coloration to be pinkish in thoracic region and blackish to the sixth segment. The dorsal vessel is faintly wine-colored and with a faint gray border on each side. First segment of prothorax relatively long, without marking; second segment about twice as long as first and faintly marked behind. First subsegment of mesothorax about 1/5 or 1/4 the second in size; faintly wine-colored; second bearing the legs, with lateral tubercles replaced by a faint outward border. First segment of abdomen very little shorter than the second, large and prominent; without lateral tubercles, but with lateral folds.

Legs short, stout. Larvae feed on aphids by biting into legs and sucking juices, are very active, wiggle head from side to side and lift abdomen when walkng.

Length, tip of jaws to end of abdomen, 1.2 mm. Length of jaws 0.07 mm. Antennae 0.15 mm. long.

Description of the third instar, within a day or two of spinning cocoon.

Head of usual shape, gray with slight amber tinge. Jaws amber at tip, sharply incurved. Antennae light amber, much annulated so that each appears brownish. Eye spots black; small darker amber border on side of head behind eyes. An elongate dark, amber spot in mid dorsal line of head. Head widest in middle, tapering at each end.

Middle of prothorax gray. First subsegment of mesothorax marked strongly with a pair of pinkish spots. These spots extend over the anterior end of second subsegment, forming a pinkish band across the larva. Metathorax is largely pink, forming a second band of pink across the body. The first abdominal segment is

largely gray except for the pinkish spots. The remainder of the body is also spotted. Each segment bears a pair of square brownish or pinkish spots near the anterior margin. There is a row of dorsal gray tubercles and each segment has a prominent lobe but no lateral tubercles. There is a white area along each side of the dorsal vessel. There is one or two rows of small, short inconspicuous setae across each segment.

Key to the "Brown Lace Wings"

A. Size large; 20-30 mm. with closed wings. From 10 to 20 radial branches. ..... Family Polystoechotidae—**Polystoechotes punctatus** Fab.

AA. Size much less than 20 mm. long. Usually less than 12 mm. long.

B. Subcosta runs into radius near the stigma; three or four radial branches from the radial sector, (not counting the smallest fork of Rs at the margin).

C. Outer margin of front wings uniformly rounded; size less than 8 mm. long .... Fam.—Sisyriidae

D. Fore wings spotted with blackish-brown and white, especially along the costal margin ..... **Climacia areolaris** Walk.

DD. Fore wings not spotted but uniformly dark blackish-brown with coppery sheen ..... **Sisyra umbrata** Needham

CC. Outer margin of wing concave or indented; length about 12 mm. ..... Fam. Berothidae—**Lomamyia flavicornis** Walk.

BB. Subcosta runs into the costa near the stigma; usually more than four radial branches from the radial sector other than the marginal fork .... Fam. Hemerobiidae

C. The basal costal veinlet is recurved and sends several branches to costa.

D. Outer cross veinlets present in hind wings; more than four crossveins in outer gradate series of front wings; size, medium to large, 6-9 mm .long.

E. A prominent yellowish dorsal band over the thorax.

F. Head pale yellow; wing margin alternating light and dark spots ..... **Hemerobius humuli** Linn.

FF. Head dark to blackish; margin of wing wholly light or with very obscure dark spots. ....**Hemerobius conjunctus** Fitch.

EE. No dorsal yellow band on thorax but thorax uniformly reddish brown or mottled.
..... **Hemerobius stigmaterus** Fitch.

DD. No outer cross veinlets in hind wings; four or less veinlets in outer gradate series of front wings; size smaller 3-6 mm. long. ..... Fam. Sympherobiidae.

E. Longitudinal veins wholly dark; cells with two dark, apparently raised bands within, enclosing a smaller cell; wings markedly iridescent ....**Sympherobius occidentalis** Fitch.

EE. Veins spotted, not uniformly dark; cells not with smaller areas enclosed with a black narrow line.

F. Wings not especially narrow, but rather broad and rounded.

G. Basal half of antennae quite black; prominent black spot near middle of hind border of front wings and another elongate black spot at anal angle. ..... **S. amiculus** Fitch.

GG. Basal portion of antennae, except first and second segments, smoky but not black; dark spot near middle of hind border of front wings small or absent, not deep black when present; one spot at anal angle smaller.

H. Costal area narrow at base. Wings with some black spots over inner gradates in addition to brown infuscations. .... **S. perparvus** McLach.

HH. Costal area somewhat broad at base; wings pale with rather even brown-

ish infuscations. ....**S. barberi** Banks.

FF. Wings conspicuously narrow with scattered large, very pale spots, especially at forking of veins ..... **S. sparsus** Banks.

CC. No recurved basal, costal veinlet; costal space narrow at base .... Fam. Hemerobiidae.

D. Gradate veinlets usually less, never much more than their length apart; a large broad winged species .... **Micromus posticus** Walk.

DD. Gradate veinlets much more than length apart. Wings quite narrow.

E. Membrane of wing considerably infuscated in spots; veins mostly brown ..**Micromus variolosus** Hagen.

EE. Membrane without dark spots; veins mostly pale; size smaller; general color grayish brown .... **Micromus subanticus** Walker.

Chrysopidae

Ten species of Chrysopids were reported in 1925. There is added herewith, three more species. The writer (Smith, 1932, p. 587) recognized eight varieties of **Chrysopa oculata** Say, two of plorabunda and two of harrisii all of which occur in Kansas. These varieties are indicated in the key.

Chrysopa arizonensis Banks. This striking species was collected at Medora, Kansas, by Dr. Painter in September. The gradate veinlets of some specimens are distinctly brown, and in some they are entirely green.

Chrysopa interrupta Schneider. This species is very difficult to separate from **C. rufilabris** Burm. **C. interrupta** always has many of the veins of the wings, including the gradates, brown while many specimens of **rufilabris** have only the gradates brown. Pinned specimens of interrupta fade to very pallid or light yellowish, while **rufilabris** generally retains considerable of the original green color. **Isodromus iceryae** (Howard) was reared from cocoons presumably made by **C. rufilabris.**

Chrysopa harrisii Fitch was reported in the 1925 list and many specimens have since been taken in Kansas.

The writer cannot distinguish between the larvae of **C. harrisii** and **C. rufilabris.** There is some evidence to indicate that the red of the larvae of **C. harrisii** is of a deeper shade or tinged with purple and the light borders of the abdomen have a pronounced yellow tinge and that these colors do not fade markedly just before spinning as is the case in the third instar of **C. rufilabris.**

Chrysopiella sabulosa (Banks) was listed in the 1925 report under the genus Chrysopa in which genus the species was first placed. No other representatives of this species from Kansas have been seen, though it is not an uncommon species in Arizona.

Nodita americana (Banks). The writer at first regarded this species as being an undescribed one, but Professor Banks determined it as **Leucochrysa americana,** which genus however, should now be known as **Nodita.** Eight specimens of this beautiful and very rare species were collected from July 19 to August 6, 1931 in a ravine southeast of Manhattan by the writer and various faculty and students assisting. The type locality of the species is Auburn, Alabama and only one other specimen (from Texas) had previously been taken. The species is readily recognized by the purple stigmas in all four wings (Fig. 4), The reddish narrow V shaped band on the vertex reddish loops under the antennae, and very dark venation.

Eremochrysa punctinervis Banks was regarded by the writer until recently, a common species only in the southwestern part of the United States. However, it has been observed in great numbers in Oklahoma and Nebraska and no doubt will be found to be abundant in certain parts of Kansas also. It is rare at Manhattan but fairly common at Medora.

Key to the Genera and Species of Chrysopidae Known to Occur in Kansas

A. Predominately dark brown or dark reddish brown in color; wing veins spotted with brown; gradate series of fore wings of few veins; ordinarily three to five brown veinlets; only one series in hind wings; small in size, length 10-14 mm...**Genus Eremochrysa** Banks.

B. Many crossveins in front wings wholly brown or blackish, not interrupted with light spots ....**E. fraterna** (Banks)

BB. Practically all of the veins, including the cross veins, spotted with light and brown. .... **E. punctinervis** (McLach)

AA. Predominately green, yellowish green or light yellowish in color; wing veins not spotted with brown and white; size generally larger.

B. Stigmas of both front and hind wings prominently marked with purplish spots. ..... **Nodita americana** (Banks)

BB. Stigmas not purplish brown but greenish or yellowish.

C. Only one series of gradate veinlets (the outer series) in the front wings, basal fourth of antennae black in color; two brownish or blackish spots below the antennae on the clypeus and genae; two more above the antennae on the vertex. ..... **Chrysopiella sabulosa** (Banks)

CC. Front wings with two series of gradate veinlets in front wings ..... Genus **Chrysopa**

D. Antennae largely black or with basal fourth blackish; large species, with gradates brown or black; one or two pairs of black spots on the genae. ..... **Chrysopa nigricornis** Burm.

DD. Antennae not black (except second segment which may or may not have a black ring); generally medium to small species.

E. Antennae with a black ring on second segment or this segment entirely black. Head with elaborate black color pattern. Oculata section of the genus **Chrysopa.**

F. All veins, except some costal cross veins in the hind wings, green; the gradates in both wings, entirely green; wings broad, rounded at tips. **C. oculata** var. **chlorophana** Burm.

FF. Some cross veins in the wings wholly or at least in part dark; gradates generally dark.

G. Black loops under the antennal sockets not connected to the band or spot under the eyes on the genae, or the connection is very faint. ..... **C. oculata** var. **separata** Banks.

GG. Genal and clypeal bands con-

nected as occurs normally.

H. Vertex uniformly yellow without separate spots or the spots forming two short, elongated spots generally connected with the black band above the antennae.

I. Vertex without any brown or black spots or there are small spots in the reddish band above the antennae.

J. No spots at all on the vertex. ....**C. oculata** var. **carei** Smith

JJ. Small, black or brown spots in or closely connected with the band above antennae. ..... **C. oculata** var. **xanthocephala** Fitch

II. Vertex with two separate, distinct, brown spots not connected with the band above the antennae ..... **C. oculata** var. **bipunctata** Fitch

III. Vertex with two or four spots normally occurring on the vertex fused into two elongate spots or short bands usually connected in front with the reddish band above the antennae. ..... **C. oculata** var. **illepida** Fitch

HH. Vertex with four separate, brownish spots and usually another behind each compound eye; pronotum with two to four pairs of black spots; wings with medium to very dark venation.

I. Usually small individuals with most cross veins brown or black; the darkest winged members of this group. ..... **C. oculata** var. **albicornis** Fitch

II. Larger specimens with only medium dark venation. Costals black only at ends. Prothorax

with three or four pairs of brownish or black spots above. .....**C. oculata** var. **oculata** Say

EE. Antennae without a black ring on the second segment.

F. A pair of narrow, bright red, converging lines on vertex above the antennae. ....**C. arizonensis** Banks

FF. Vertex without the converging red lines above antennae.

G. All veins including the gradates are green or light yellowish in color; no brown or black veins; wings conspicously long and narrow. .... plorabunda section of Chrysopa

H. Genae with a definite, narrow, black or very dark red band from the eyes to the mouth (rarely absent in badly faded specimens.

I. Little or no red bordering the narrow black bands ..... **C. plorabunda** Fitch

II. Considerable reddish suffusion along the black bands reaching well over the genae and sides of clypeus ..... C. **plorabunda** var. **californica** Coq.

HH. Genae without the narrow, black, or very dark red band from the eyes to the mouth, but clypeus suffused with red.

I. Genae and clypeus only slightly reddish; body deep green in life, ivory stripe prominent, particularly over the pronotum, wings narrow .... **C. harrisii** Fitch

II. Genae and clypeus strongly marked red; body light green or yellowish in color, stripe not especially prominent, wings narrower ....**C. harrisii** var **externa** Hagen

GG. Gradate veinlets and some other cross veins brown or black; wings broader and more rounded apically. .... rufilabris section of Chrysopa.

H. At least two pairs of orange spots on the pronotum; often a pair on the vertex near the eyes and orange spotting

on the mesonotum and side of abdominal segments; a dark-red band on each gena. ..... **C. quadripunctata** Burm.

HH. No definite yellow or orange spots on the pronotum ,the head nor abdomen.

I. Genal band is some shade of red, usually bright red, with borders of band definite and clear cut.

J. Color, green in life, often fading to light green or yellowish green when pinned; usually only the gradate veinlets brown; dorsal ivory band fairly conspicuous. ....**C. rufilabris** Burm.

JJ. Color in life, light green; straw yellow to a very light yellowish when pinned, with gradates and many other veins wholly or in part brown. ..... **C. interrupta** Burm.

II. A narrow blackish band over the genae; brown veins of wings with a brown clouding in the membrane adjacent to them. .... **C. cockerelli** Banks

Myrmeleontidae

The revision of this family by Banks (1927) has been a great help in the identification of these insects. The names of some species included in the 1925 list have been changed and three additional species are reported for the state.

Cryptoleon nebulosum Oliv. One of the most plentiful ant lion species on the sand dunes at Medora, Kansas. Many specimens collected May to August. A closely related species **Cryptoleon signatum** (Hagen), previously noted, also occurs at Medora but it is less common.

Hesperoleon texanus (Banks) listed as **Brachynemurus texanus** appears to be the most common ant lion at Medora.

Hesperoleon nigrilabris (Hagen). Previously listed under **Brachynemurus**

Hesperoleon blandus (Hagen). Formerly listed under **Brachynemurus.**

Hesperoleon hubbardi (Currie). One of the most common Arizona species but rare in Kansas. One speci-

men from Clark county. Reported by Banks (1927) from Morton county.

Hesperoleon mexicanus (Banks). A southwestern species taken at Medora (Reno county) in July; also one specimen from Hamilton county. First report from Kansas.

Hesperoleon sackeni (Hagen). Reported for first time from Kansas, from Scott county Kansas. Numerous specimens were collected by H. O. Deay June 20, 1925.

Hesperoleon irregularis (Currie). Formerly listed under **Brachynemurus.** Six specimens from Manhattan and Medora collected in July.

Hesperoleon carrizonus (Hagen). Several specimens from Medora taken at lights.

Hesperoleon douglasi Banks. One specimen from Morton county, July. C. O. Bare.

Hesperoleon abdominalis (Say). Formerly listed under **Brachynemurus.** This species continues to be the most commonly collected ant lion in Kansas.

Hesperoleon coquilletti (Currie). Reported by Banks (1927, p. 38) from Hamilton county.

Hesperoleon minusculus (Banks). Here first reported for Kansas from specimens collected by Dr. Painter at Medora, Kansas, in July.

Psammoleon guttipes Banks. Four specimens from Ellsworth, Russell, Montgomery, and Riley counties.

Myrmeleon rusticus Hagen. A single specimen of this uncommon species was collected by Dr. R. H. Painter, in Scott County, Kansas, Aug. 19, 1933.

Myrmeleon immaculatus De Geer (Fig. 10). This has lately been found to be the most common reared species at Manhattan. Many larvae have been collected in pits in garages and around houses and reared to adults. Only a few adults have been collected. All were taken at lights. The larvae are light, pinkish gray (Fig. 8). Jaws black with three equidistant short, stout spines projecting inward; head gray with two pairs of brown spots. Three rows of elongate black spots on body. Body pinkish gray, covered with short black stout setae of various lengths. This species passes the winter as partly grown larvae. Spin cocoons from April to July (Fig. 11). Adults are out June to August.

Two previously unreported parasites were reared from cocoons of this species. Four bombyliid flies iden-

tified by Dr. R. H. Painter as **Dipalta serpentina** Osten Sacken, were obtained from cocoons. This is the first record of a bombyliid parasite on ant lions and the first identification of the host of this fly. Another new record is a parasite represented by three adults of an unusual Chalcid, determined as **Stomatoceras** sp. by Dr. Muesebeck, which emerged from cocoons presumably from larvae of this same species of ant lion, collected both in Kansas and Oklahoma.

Key to the Species of Myrmeleontidae Known to Occur in Kansas

A. Both wings with conspicuous black or brownish black circular spots, blotches or bars, while the rest of the wings is relatively hyaline. ..... **Dendroleon obsoletum** Say.

AA. Wings light or dark but not with the markings in the form of prominent black spots; veins generally conspicuously alternating light and dark.

B. No reddish brown tibial spurs (Black spines are present but not the spurs).

C. Veins very dark, making the wings conspicuously dark and cloudy. Pronotum almost wholly black. ..... **Cryptoleon nebulosum** (Oliv).

CC. Wings noticeably light, the alternate brown and light spotting on the wings being subdued. Thorax with four narrow black longitudinal lines separated by yellowish areas. ..... **Cryptoleon signatum** (Hagen).

BB. Tibial spurs present.

C. Prontum without definite stripes or bands, being rather uniformly grayish with a pair of indefinite, yellowish spots anteriorally; tibial spurs nearly straight and as long as the basal segment.

D. Large species with a row of elongate light and dark areas along radius of the front wings. Cells between R1 and Rs are very long (Fig. 10) ..... **Myrmeleon immaculatus** De Geer

DD. Smaller species, wings almost unmarked, cells between R1 and Rs of front wings small or the size of other cells...**Myrmeleon rusticus** Hagen

CC. Prothorax with definite spots or stripes of gray, brown or black. Tibial spurs more or less curved.

D. Tibial spurs much curved and nearly or quite

as long as the three basal tarsal segments. Front wings with two parallel brown line-like spots converging basally, the outer one beginning below the stigma and the other one about half way between the first and the base of the wing; large species; body two shades of gray. ..... **Psammoleon guttipes** Banks.

DD. Tibial spurs only slightly curved, not as long as the first three tarsal segments, usually only as long as the basal segment. Front wings without the two conspicuous lines.

E. Labrum black, while clypeus is yellow; large species with yellow stigmas; four narrow brown lines on the yellow pronotum, the outer two only 2/3 as long as the inner two and somewhat converging. ....**Hesperoleon nigrilabris** (Hagen).

EE. Labrum yellow, at least in part.

F. Pronotum with a single broad, light brown band along the median portion, with a yellowish area each side. Small species, with conspicuously uniform brown venation and some brown clouding in the membrane, particularly along radius. ....**Hesperoleon irregularis** (Currie).

FF. Pronotum not with a single broad, median, light-brown band, but with several narrow bands.

G. Most abdominal segments with three whitish or grayish spots extended nearly or completely around to the venter; abdomen evenly and conspicuously spotted; a small species with 4 partly fused narrow lines on pronotum, the inner pair longer and very close together; the outer two converging, widely separated from inner pair but connected anteriorly with them by a faint loop. ....**Hesperoleon sackeni** (Hagen).

GG. Abdomen wholly brown or black; light spots, if present, are elongate, not circular, nor extending around the segments.

H. Basal portion of abdomen almost wholly light in color or more light than dark.

I. Basal two thirds of abdomen almost wholly light in color; marked in median

line with an incomplete row of elongate dark spots; wings lightly spotted only along Sc and Rl; dark clouding along some cross veins between M and Cu 1... .....**Hesperoleon texanus** Banks.

II. Abdomen not so light, but with a continuous median dark band and a pair of lateral ones; front wings with cloudings between forks at outer margins; wings more spotted than in previous species, and the size a little smaller generally. .. .. **Hesperoleon minusculus** (Banks).

HH. Basal portion of abdomen not predominately light in color, spots on same, when present, are elongate or in form of narrow bands.

I. Hind margin of hind wings near base concave; lateral pronotal stripes united at base with median ones. .... **Hesperoleon blandus** Hagen.

II. Hind margin of hind wings not concave; lateral stripes, when present separate from median pair.

J. Only one pair of dorso-lateral, brown bands on the pronotum, each broader posteriorly. Rest of pronotum yellow. Media pale, practically or wholly without any dark spots. .... **Hesperoleon abdominalis** (Say).

JJ. More than one pair of bands on the pronotum. Media alternately light and brown spotted.

K. Wings practically without spots. Pronotum yellow with a pair of narrow outer convergent brown lines; the inner pair forming four dots. .... **Hesperoleon coquilleti** (Currie).

KK. Wings with some spots. Inner pair of pronotal marks not forming four spots.

L. Hind femora yellow, dotted somewhat evenly with black; stigmas without adjacent black spots.

M. Wings conspicuously spotted; membrane infuscated at ends of

costal cross veins. Front coxae without several long white spines. .. **Hesperoleon mexicanus** Banks.

MM. Wings not spotted, practically unmarked; no markings in membranes at ends of costal veinlets; front coxae with one or two long white setae. ....**Hesperoleon hubbardi** (Currie).

LL. Hind femora heavily spotted with black; a black spot near the white stigmas.

M. Black spots on hind femora run together, forming a blackish suffusion; membrane of wing infuscated along cubitus and many of the gradate veinlets. ....**Hesperoleon carrizonus** Hagen.

MM. Black spots on hind femora do not run together; no marked infuscation along cubitus; inner pair of pronotal marks very close. even converging behind. .... **Hesperoleon douglasi** Banks.

Coniopterygidae

In addition to **Coniopteryx vicina** Hagen, previously listed, two more species have been collected in Kansas since the 1925 list.

Malacomyza fitchi Banks. A very large series of this species has been collected at Manhattan from June to August by beating branches of trees, especially oaks, along Wildcat creek.

Malacomyza westwoodi Fitch. Many representatives of this species were collected at Manhattan in May and August. It is apparently the most common representative of this species in Kansas. Larvae of this family have been very rarely collected, however.

Key to the Three Species of the Coniopterygidae Known to Occur in Kansas

A. The cross vein from cubitus to media in the front wings ends on media before the fork.

B. In front wings the cross-veinlets connecting cubitus

and media distinct, while others are almost invisible. ..... **Malacomyza westwoodi** Fitch.

BB. Cross-veinlets in apical half of wings all fairly distinct. ..... **Malacomyza fitchi** Banks.

AA. The cross vein from cubitus to media ends beyond the fork on M3 and M4. .. **Coniopteryx vicina** Hagen.

Ascalaphidae

Two species, **Ululodes macleayana hageni** Van der Weele and **Coleobopterus excisus** Hagen were reported in 1925. No additional species from the state have been seen. The variety of the first, which is by far the more common of the two, occurring in Kansas is **hageni.** A fully grown larva, presumably of this species, was collected on the campus May 17, 1923 (Figs. 7 and 9).

Key for Distinguishing the Two Species of Ascalaphidae Known to Occur in Kansas

A. Anal margin of hind wing greatly narrowed by prominent lobular indentation; stigmas yellow. .... **Coleobopterus excisus** Hagen.

AA. Anal margin of hind wing not narrowed, extends in a broad, full curve; stigmas black or dark brown. .... **Ululodes macleayana hageni** Van der Weele.

MECOPTERA

Carpenter's revision (1931) has appeared since the 1925 list of Mecoptera for the state. This work will prove of great assistance in recognizing the various species of this order.

Bittacus stigmaterus Say. The excellent life history report of this species by Setty (1931) is the best available in this family. The account of the biology by Carpenter (1931) is also good, though it is largely historical.

Bittacus pilicornis Westwood. Specimens in K. U. collection from Douglas county, also listed by Carpenter (1931, p. 262).

Panorpa anomala Carpenter. Described by Carpenter (1931, p. 245), from Leavenworth and Douglas counties, Kansas. Carpenter states that this is very likely the **confusa** of the 1925 list.

No additional observations on the other three species, indicated in the key, have been made.

Key to the Six Species of Mecoptera Known to Occur in Kansas

A. No brown or black spots in wings; tarsi with a single

claw and fitted for grasping.

B. Cross vein between subcosta and Rl is distad or beyond the forking of the radial sector in the fore wings. ..... **Bittacus occidentis** Walker.

BB. Cross vein between Sc and Rl basad or before the fork of the radial sector forking in the fore wings.

C. Antennae sparsely covered, especially distally, with long pile; cross veins narrowly margined with blackish clouding. .... **Bittacus pilicornis** Westw.

CC. Antennae without covering of long hair or pile.

D. Hind femora slender; cross veins of wings margined with fuscous. .... **Bittacus strigosus** Hagen.

DD. Hind femora and tibiae thickened; cross veins lightly or not at all margined. .... **Bittacus stigmaterus** Say.

AA. Wings with brown or black bands or spots on veins.

B. Wings with very dark bands or spots across veins; apex of wing entirely black. .... **Panorpa nuptialis** Gerst.

BB. Wings without the prominent black or brown bands across the wings. ..... **Panorpa anomala** Carpenter.

SUMMARY

Tabular Summary of the Neuroptera Known to Occur in Kansas.

Name of Family	Species in Kansas reported in the 1925 list	Additional species reported here	Total Kansas Species	Species in N. Y. State as recorded in the 1928 list
Sialidae	4	0	4	10
Mantispidae	3	0	3	2
Sisyriidae	1	1	2	3
Sympherobiidae	4	1	5	2
Hemerobiidae	4	2	6	15
Berothidae	1	0	1	1
Polystoechotidae	1	0	1	1
Chrysopidae	10	3	13	15
Myrmeleontidae	10	8	18	6
Ascalaphidae	2	0	2	2
Coniopterygidae	1	2	3	4
Totals	41	17	58	61

A total of 58 species of Neuroptera for Kansas compares favorably with 61 species for New York State where much more intensive collecting has been done. Additional species in the families Hemerobiidae, Chrysopidae and Myrmeleontidae, in particular, no doubt occur in the state.

Five species of Mecoptera were previously reported for the state, one of which has since been described as a new species. One additional species is being reported herewith, making a total of six "scorpion and hanging flies" known to occur in Kansas.

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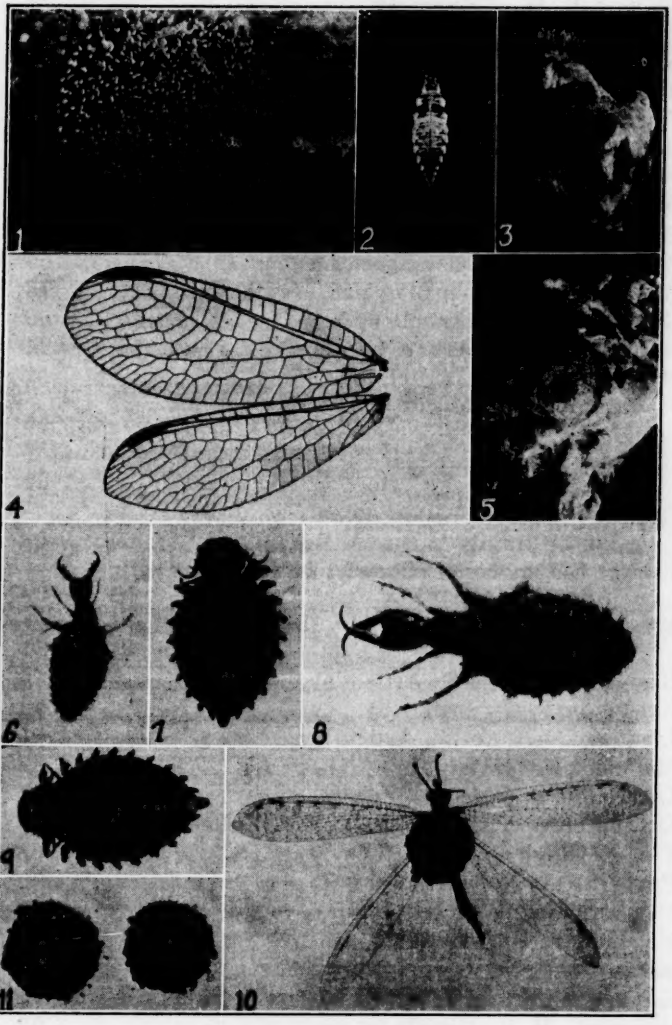
EXPLANATION OF PLATE

Mr. Floyd J. Hanna took all of the photographs included herewith, and made up the plate.

1. Group of eggs laid by **Mantispa interrupta** Say. Adult collected by H. H. Schwardt, Bentonville, Ark., Oct. 8, 1927.
2. Mature larva of **Chrysopa rufilabris** Burm., taken by beating limbs of oak trees along Wild Cat creek.
3. Cocoon of **Mantispa interrupta** Say in spider's nest on which an adult female spider, **Philaeus militaris** Htz., was taken.
4. Wings of **Nodita (Leucochrysa) americana** (Banks).
5. Cocoon presumably of **Mantispa interrupta** in nest of spider, from which a parasite had emerged.
6. Ventral aspect of larva, presumably **Myrmeleon immaculatus** DeGeer.
7. Dorsal aspect of an Ascalaphid larva found on the college campus in a dusty path, May 17, 1923, by James Payne, Jr.
8. Dorsal view of larva of **M. immaculatus.**
9. Ventral view of the Ascalaphid larva shown in Fig. 7.
10. Adult of **M. immaculatus** with cocoon beneath.
11. Cocoons of **M. immaculatus** made when confined in a pan of sand.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Correction

On page 87 the name in the title should read Ornithodorus turicata Duges.

SUBSCRIPTION NOTICE

It has been determined that the cost of circulation and publication of Volume 8 of the Journal of the Kansas Entomological Society will be fully 75 per cent higher than that of earlier volumes, which necessitates an increase in the subscription price of the Journal. The increased costs are due to the effect of circulation and banking charges, and N. R. A. codes on the cost of paper and printing.

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R. L. PARKER, Secretary-Treasurer.

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